REMARKS

In the Office Action, the Examiner indicated that claims 1-6, 9-16, 18-23, 25-30 and 33-38 are pending in the application and the Examiner rejected all claims.

Claim Rejections, 35 U.S.C. §112

On page 2 of the Office Action, the Examiner rejected claim 38 as being indefinite for failing to particular point out and distinctly claim the subject matter which Applicants regards as the invention. Specifically, the Examiner asserts the limitation "parasitic capacitor has a capacitance that is as small as possible" is not a positive structural limitation.

Applicants respectfully disagree with Examiner's assertion. The full text of the claimed limitation is "wherein the parasitic capacitor has a capacitance that is as small as possible while still preventing common mode noise signals from interfering with signals being transmitted...." (claim 38, lines 7-8). This is a positive structural limitation as it accurately defines the functionality of the parasitic capacitor. One of ordinary skill in the art would be able to determine the exact characteristics of the parasitic capacitor that meets this without undue experimentation.

Claim Rejections, 35 U.S.C. §103

On page 3 of the Office Action, the Examiner rejected claims 1-6, 9-19, 21-23, 25-30, and 33-38 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,212,263 to Sun et al. in view of U.S. Patent No. 6,137,392 to Herbert and further in view of U.S. Patent No. 4,401,955 to Yorinks et al.

On page 7 of the Office Action, the Examiner rejected claim 20 under 35 U.S.C. §103(a) as being unpatentable over Sun et al. in view of Herbert and further in view of Pugel et al., and further in view of U.S. Patent No. 5,864,580 to Lowe et al.

The Present Invention

The present invention improves the attenuation of an undesired signal found in a differential signal path by using inductive, as opposed to capacitive, coupling. The inventive electrical interface includes a primary inductor, a secondary inductor, and a filter. The primary inductor and the secondary inductor operably couple an input differential signal pair to an output differential signal pair, and the filter attenuates an undesired signal in the output differential signal pair. The input differential pair is formed by using a differential driver, e.g., a CODEC, to generate the pair from a single input line (e.g., a tip line).

The invention includes a parasitic capacitor operably coupled between the primary and the secondary inductor. The parasitic capacitor has a capacitance that is as small as possible while still preventing common mode noise signals from interfering with signals being transmitted over the input differential pair. In a preferred embodiment, the capacitance is in the range of approximately 0.5 pF to approximately 2.5 pF.

The invention also includes a method for interfacing an input differential signal pair to an output differential signal pair. In particular, the method includes the steps of inductively coupling the input differential signal pair to an output differential signal pair, and filtering out a common mode signal occurring in the output differential signal pair. The inventive method

improves the attenuation of an undesired signal found in a differential signal path by using inductive coupling.

U.S. Patent No. 6,212,263 to Sun et al.

U.S. Patent No. 6,212,263 to Sun et al. ("Sun") teaches a combination X digital subscriber line (xDSL) and analog modem that includes a computer bus interface, CODECs, an analog front end for xDSL communications coupled to a POTS line and a direct access arrangement for analog communication also connected to the POTS line. Sun is teaching the transfer of ADSL data in the 10 kHz to 1 MHz band also referred to as "base band". These base band signals are those signals defined in the ADSL standard E1-T1 413 issue 2 and its successors. ADSL data by its nature is high entropy data, that is, it contains large amounts of information in each symbol. As is well known, there are clear differences in the characteristics of low frequency, high entropy data such as ADSL data and high frequency, low entropy data. The Examiner acknowledges that Sun fails to teach a capacitor operably coupled between a primary inductor and a secondary inductor.

U.S. Patent No. 6,137,392 to Herbert ("Herbert")

U.S. Patent No. 6,137,392 to Herbert ("Herbert") teaches a transformer for switched power mode power supplies comprising an input stage transformer. This transformer is designed for improved coupling and low primary leakage inductance, without regard for insulation above "working insulation" or for interwinding capacitance. One or more additional stage transformer sections are optimized for low interwinding capacitance and high

dielectric isolation. The secondary of the input stage device drives the primary of the next stage, so that the transformer stages are in series. Accordingly, the total interwinding capacitance from end to end is low and the total dielectric isolation from end to end is high. The secondary of the input stage transformer is isolated from both the input and the output, so it can be grounded as a safety measure (Herbert, abstract and summary). The Examiner relies on Herbert for an alleged teaching of a capacitor operably coupled between a primary inductor and a secondary inductor, however the Examiner acknowledges that Herbert fails to teach a parasitic capacitor with a capacitance value in a range of approximately 0.5 pF to approximately 2.5 pF.

U.S. Patent No. 4,410,955 to Yorinks et al. ("Yorinks")

U.S. Patent No. 4,410,955 to Yorinks et al. ("Yorinks") teaches a coaxial power divider structure which is configured in a manner that allows for closely packing the circuit components in a planar structure. By structuring the components in a planar orientation, a compact, densely packable structure results. The Examiner relies on Pugel for an alleged teaching of a parasitic capacitor with a capacitance value in a range of approximately 0.5 pF to approximately 2.5 pF.

U.S. Patent No. 5,864,580 to Lowe et al. ("Lowe")

U.S. Patent No. 5,864,580 to Lowe et al. ("Lowe") teaches a wireless modem employing a radio frequency (RF) transponder system to remotely access memory of a separate device. By utilizing several circuit components, such as a transponder including a

transmit/receive antenna, a reading circuit, a programming circuit, and a transponder memory block, Lowe can access remote memory, download materials, and store them in the wireless modem. The Examiner relies on Lowe for an alleged teaching of a shunt regulator.

The Examiner Has Not Established a *Prima Facie* Case of Obviousness

As set forth in the MPEP:

> To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combine reference teachings.
> MPEP 2143

Applicants has previously amended and/or added to the independent claims to focus the present invention on the use of a parasitic capacitor between the primary inductor and the secondary inductor, and using a capacitance value for the parasitic capacitor that is as small as possible while still preventing common mode noise signals from interfering with signals being transmitted over the input differential pair. In a preferred embodiment, this capacitance value is in a range of approximately 0.5 pF to approximately 2.5 pF. Arguments relating to previously cited prior art are repeated below for the Examiner's convenience, along with new arguments addressing the prior art cited solely in the Office Action dated March 14, 2006.

Since the Examiner has acknowledged that Sun fails to teach a capacitance operably coupled between the primary inductor and the secondary inductor, the focus of this argument turns to the Examiner's assertion that Herbert teaches a capacitor coupled between the primary and secondary inductors for the purpose of obtaining a high dielectric isolation, and the

Examiner's assertion that Yorinks teaches a filter capacitor in the range of approximately 0.5 to approximately 2.5 pF.

The Examiner looks to Herbert to teach a capacitance operably coupled between the primary inductor and the secondary inductor and provide motivation for including this as an added feature to the system provided by Sun. The Examiner says it would be obvious to modify the transformer taught by Sun (shown in Sun, Fig. 6) to include a parasitic capacitor operably coupled between the primary inductor and the secondary inductor as taught by Herbert "to improve characteristics include [sic] a small size and low profile, and low temperature rise as suggested by Herbert at column 2, line 1-6" (page 3 of Office Action). However, these results are the goal of the complete system taught by Herbert, not the reasons for including a parasitic capacitor. Herbert provides no direct motivation for including a parasitic capacitor. Additionally, Sun does not include a capacitor coupled between the primary inductor and the secondary inductor. It is unclear how adding an additional component to Sun would result in a smaller size and lower profile. If anything, the addition of a capacitor to Sun would result in a larger size and higher profile. At best, impermissible hindsight is being used to attempt to find a basis for rejecting the claimed invention under 35 U.S.C. §103. However, since fundamental teachings and/or suggestions, which would be required to make the rejections valid, are missing, the rejection of the claims must fail.

Secondly, the Examiner looks to Yorinks to teach the capacitor has a capacitance in the range of approximately 0.5 pF to approximately 2.5 pF. Yorinks is directed towards a power divider circuit used for receiving power transmitted over a coaxial line which utilizes a .5 pF capacitor in the disclosed circuitry. However, Yorinks provides no motivation for using a .5

pF capacitor in either the power supply circuit of Sun or the switched mode transformer of Herbert. Additionally, the Examiner provides no motivation from Yorinks to modify either Sun or Herbert. Again, the same motivation for combination is cited as before, "to improve characteristics include [sic] a small size and low profile, and low temperature rise as suggested by Herbert at column 2, line 1-6." Herbert teaches a system operating on a power scale that exceeds the power scale of the present invention by a factor of greater than 1000. Nowhere does Herbert suggest utilizing low capacitance components, such as the presently claimed parasitic capacitor. At best, impermissible hindsight is being used to attempt to find a basis for rejecting the claimed invention under 35 U.S.C. §103. However, since fundamental teachings and/or suggestions, which would be required to make the rejections valid, are missing, the rejection of the claims must fail.

Since each of the independent claims specifically recite the minimization of the capacitance of the parasitic capacitor (claims 1, 21, and 30 specifying the range of 0.5 pF to 2.5 pF and claim 38 specifying that the capacitance be minimized according to certain parameters), the claimed invention patentably defines over Sun, Herbert and Yorinks, whether considered alone or in any combination. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1-6, 9-19, 21-23, 25-30, and 33-38 under 35 U.S.C. §103.

Finally, the Examiner looks to Lowe to teach the use of a shunt regulator in the rejection of claim 20. As noted above, Lowe teaches a wireless modem used to connect to a remote device. Lowe fails to teach a parasitic capacitor operably coupled between a primary inductor and a secondary inductor as is taught by the present invention. As noted above, Sun,

Herbert and Yorinks, whether considered alone or in combination, fail to teach utilizing a parasitic capacitor operably coupled between a primary inductor and a secondary inductor wherein the capacitance of the parasitic capacitor is either within a specific range or chosen such that it is as small as possible while still preventing common mode noise. Therefore, no combination of Sun, Herbert, Yorinks and Lowe teach the presently claimed invention. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection of claim 20 under 35 U.S.C. §103.

As set forth in a previous response, Applicants notes that the minimization of the capacitance between the primary inductor and the secondary inductor is a key element of the present invention. With inductive coupling, there is always some amount of common mode voltage that is present, and the common mode voltage exists over a wide band of frequencies. That very wide band of frequencies can interfere with circuits connected to capacitively coupled circuits and cause the circuits to fail due to the interference. Sun, in teaching the transfer of base band signals, transfers signals in the frequency range between 100 Hz and 4 kHz. By contrast, the present invention is a pass band signaling scheme and will be transmitting signals in the MHz range. Further, as noted above, Sun is an ADSL system which uses high entropy data. With high entropy data, the filtering boundaries must be very clearly defined. For example, with ADSL, the filters must have a very clearly-defined pass band, transition band, and stop band. By contrast, the low entropy data being transmitted with the present invention does not require this level of precision and thus can have, for example, low pass filtering and high pass filtering that together attenuates signals over a wide frequency range of approximately 50 kHz to approximately 10 MHz.

Conclusion

The present invention is not taught or suggested by the prior art. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection of the claims. An early Notice of Allowance is earnestly solicited.

The Commissioner is hereby authorized to charge any additional fees or credit any overpayment associated with this communication to Deposit Account No. 19-5425.

Respectfully submitted,

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Date

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